

Dec. 9, 2005 2:19PM

WORLD INTELLECTUAL PROPERTY ORGANIZATION
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No. 0051 P. 7K

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : D03D 15/00, D04B 1/16		A1	(11) International Publication Number: WO 98/26118
			(43) International Publication Date: 18 June 1998 (18.06.98)
(21) International Application Number: PCT/NL97/00681		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DB, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 9 December 1997 (09.12.97)			
(30) Priority Data: 1004740 10 December 1996 (10.12.96) NL			
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(54) Title: CLOTH

(57) Abstract

The invention relates to a cloth consisting at least partially of fibres or yarns which are composed of at least two or more components, wherein at least one of the components is a strength-providing component and the other components are density-causing components. The cloth preferably consists at least partially of fibres or yarns which are composed of at least two or more components with different melting points but manufactured from the same raw material; wherein the cloth has undergone a thermal treatment under pressure. The cloth is suitable for a large number of applications, for instance as sailcloth, as conveyor belts or running belts, as parachute material, in ultra-light aircraft such as hang-gliders, air balloons, filters for ultrafiltration or reverse osmosis, in sun-protection products such as parasols, sunblinds, roller blinds, Venetian blinds, pleated curtains, in luggage articles such as rucksacks, suitcases, travel bags, ski bags, in clothing such as raincoats, windcheaters, sailing clothing, ski clothing, gloves, in airbags, tarpaulins, etc.

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CLOTH

The present invention relates to new cloth and its applications.

Specialized cloth is required for different advanced technical applications such as filtration. Such cloth must sometimes be completely closed or substantially completely closed. Situations can however also be envisaged in the domestic or recreational sphere where strong and fully or substantially fully closed cloth could find a use, for instance as rainwear, bags, suitcases, sun protection, umbrellas and so on.

For this type of application foils are therefore often used which are manufactured from plastic and the like. However, foils frequently have insufficient strength and can tear easily. Use is also made of inducing shrinkage in a fabric, whereby the openings therein become smaller. This does not however always produce the desired result. A fully closed cloth is never achieved.

It is therefore the object of the present invention to provide a new type of cloth which, if desired, can be made completely closed or substantially completely closed and therein still have sufficiently great strength.

This is achieved according to the invention by cloth which consists at least partially of fibres or yarns which are composed of at least two or more components, wherein at least one of the components is a strength-providing component and the other component(s) is (are) a density-causing component(s).

Such a cloth preferably consists at least partially of fibres or yarns which are composed of at least two components from the same raw material but with different melting points, wherein the cloth has undergone a thermal treatment under pressure. The component with the high melting point remains intact under the treatment at increased temperature and pressure and provides the cloth

with strength, while the low-melting component flows out, thus wholly or partially causing density.

The cloth can be a fabric, knit, tricot, non-woven or combination thereof. Due to the thermal treatment under pressure the fibre or yarn component with the low melting point will melt and run into the openings between the warp and weft threads or between the loops of a knit or tricot or between the fibre fragments of a non-woven and thereby wholly or partially close them. However, because the fibres or yarns also have a high-melting component to which nothing happens during the thermal treatment under pressure, the whole-cloth still retains the strength of a fabric, knit, tricot or non-woven, this strength being co-determined by the raw material from which the fibres or yarns are manufactured. In addition, the application of a coating or impregnation of the cloth now becomes unnecessary.

The fibres or yarns according to the invention can consist in any random manner of two or more components with a different melting point. Particularly recommended are fibres consisting of a core of high-melting (or normally-melting) material and a coating of low-melting material. Alternatively, fibres can be used consisting of a mixture of two or more types of fibrils, of which the one type consists of a low-melting material and the other of a high-melting or normally-melting material. Both the high-melting (or normally-melting) materials and the low-melting materials preferably consist of the same raw material, more preferably of polyester.

In addition, half the fibres can also consist of the high-melting (or normally-melting) material and the rest of the low-melting material. Yarns consisting of a plurality of fibres can be structured from one or more fibres of high-melting material and one or more fibres of low-melting material. The fibres can for instance have a round cross-section, although other cross-sections, such as for instance a trilobal shape, are also possible.

Such fibres and yarns consisting of a plurality of components are known in this technical field under the name "bicomponent fibres or yarns" or "hybrid fibres or

yarns". They can occur in combinations of natural and (semi-)synthetic yarns or fibres, both as monofilaments of a thickness of between for instance 0.1 mm and 2 mm or between 7.5 dtex (0.027 mm) and 45 dtex (0.064 mm).

- 5 According to the invention hybrid fibres or yarns of the same raw material are preferably used, for instance polyester.

In an alternative embodiment a so-called Partially Oriented Yarn (POY) can be used instead of at least a
10 part of the low-melting component.

The present invention is particularly suitable for use as sailcloth. Sails, which can be exposed to high wind forces, must especially be strong. For some applications sailcloth must moreover be air-tight. For large
15 sails however, material is recommended which is still partially air-permeable. Sailcloth manufactured from the cloth according to the present invention has in any case the strength of a fabric and, by varying the density of the low-melting component, the cloth can be made wholly
20 or partially air-tight. Sailcloth is preferably manufactured from two types of polyester with different melting points. The advantage of using a low-melting (for instance at about 170°C) polyester on the one hand and a normally-melting (for instance at about 255°C) polyester
25 on the other is that the fibre in the finished product has sufficient strength for the application in sailcloth. Such a suitable strength could not be achieved with the use of a combination of for instance low-melting polyester and high-melting polypropylene or polyethylene.

30 The fabric according to the invention has the further advantage that, due to the melting of the low-melting part, the stretch, particularly in the Bias (45° direction) is very greatly decreased because the intersections of warp and weft are fused. This is desirable
35 for determined applications.

In addition, the cloth according to the present invention is particularly suitable for use in conveyor belts or running belts. The advantage of use in running belts, for instance running belts in training equipment,
40 is that the cloth can be much thinner than the rubber

belts used heretofore. This has the advantage that the heat generated in the cloth by the movement can be discharged much more easily. Such belts can thereby be used longer and more intensively.

5 The cloth according to the present invention is further suitable as parachute material and as material for use in ultra-light aircraft such as hang-gliders, but also normal gliders, in air balloons and so on.

Because the cloth can be made completely closed it
10 is also suitable for use in waterproof clothing, such as raincoats, ski clothing or windcheaters as well as for shower curtains, tarpaulins, rucksacks, suitcases, travel bags, umbrellas and so on.

Cloth according to the invention can also be used in
15 sun-protection products such as sunblinds, roller blinds, Venetian blinds, pleated curtains and in airbags.

A cloth which is not completely closed is particularly suitable as filter for ultrafiltration or reverse osmosis.

20 The cloth according to the present invention can be obtained by providing a fabric, knit, tricot or non-woven of fibres or yarns which are composed of at least two components with different melting points and subjecting the cloth to a thermal treatment under pressure. The
25 thermal treatment under pressure is preferably a calendering treatment. The calendering preferably takes place at a pressure of 10 to 60 tons, preferably 30 to 50 tons and a temperature of 100 to 500°C, preferably 150 to 250°C, more preferably at about 180°C. The pressure and
30 temperature depend of course on the yarn or fibre material used. And the temperature in particular must be chosen such that only the low-melting component melts sufficiently to enable good flow, but the high-melting component substantially does not melt, or is at least left
35 intact such that a desired strength is retained.

The table below gives a number of examples of applications.

Applications		Threads per cm (warp/weft)	Thickness (d tex) (warp/weft)
5	Conveyor belt cloth	min. max.	7/7 15/15 2200/2200 280/280
	Sailcloth	min. max.	14/14 52/52 1100/1100 167/167
10	Filter cloth	min. max.	36/36 80/80 100/100 50/50
	Suitcase cloth	min. max.	6/6 13/13 1002/1002 501/501
15	Sunblind cloth	min. max.	23/23 45/45 195/195 76/76

The present invention is further elucidated with reference to the examples below, which are only given by way of illustration.

15

EXAMPLES

EXAMPLE 1

Manufacture of a fully closed cloth

20 A fabric is manufactured from Polyester hybrid HT with a yarn number of 280 d tex and 48 fibrils with 38 warp threads per cm and 22 weft threads per cm. The fabric is then carried at a cycle speed of 18 m/min through a calendering device in which it is calendered at 25 a pressure of 40 tons and a temperature of 200°C.

The thus obtained cloth was found to be completely closed.

EXAMPLE 2**Manufacture of a substantially closed fabric**

A fabric is manufactured from Polyester HT with a
5 yarn number of 280 dtex and 48 fibrils with 43 warp
threads per cm and 15 weft threads. The fabric is then
carried at a cycle speed of 15 m/min through a calender-
ing device in which it is calendered at a pressure of 30
tons and a temperature of 180°C.

10 The obtained cloth was still found to be 9% perme-
able.

CLAIMS

1. Cloth consisting at least partially of fibres or yarns which are composed of at least two or more components, wherein at least one of the components is a strength-providing component and the other components are density-causing components.
5
2. Cloth as claimed in claim 1, consisting at least partially of fibres or yarns which are composed of at least two or more components from the same raw material but with different melting points, wherein the cloth has
10 undergone a thermal treatment under pressure.
3. Cloth as claimed in claim 1 or 2, characterized in that the cloth is a fabric, knit, non-woven or a combination thereof.
4. Cloth as claimed in claim 1, 2 or 3, characterized in that the fibres consist of a core of high-melting (or normally-melting) material and a coating of low-melting material.
15
5. Cloth as claimed in claim 1, 2 or 3, characterized in that substantially half the fibres consist of a high-melting (or normally-melting) material and the rest of low-melting material.
20
6. Cloth as claimed in claim 1, 2 or 3, characterized in that the yarns consist of one or more fibres of high-melting (or normally-melting) material and one or
25 more fibres of low-melting material.
7. Cloth as claimed in claims 4, 5 and 6, characterized in that the high-melting (or normally-melting) material and the low-melting material are manufactured from the same raw material.
- 30 8. Cloth as claimed in claim 7, characterized in that the raw material is polyester.
9. Cloth as claimed in any of the claims 1-8 for use as sailcloth, as conveyor belts or running belts, as
35 parachute material, in ultra-light aircraft such as hang-gliders, air balloons, filters for ultrafiltration or reverse osmosis, in sun-protection products such as

parasols, sunblinds, roller blinds, Venetian blinds, pleated curtains, in luggage articles such as rucksacks, suitcases, travel bags, ski bags, in clothing such as raincoats, windcheaters, sailing clothing, ski clothing, 5 gloves, in airbags, tarpaulins etc.

10. Cloth as claimed in any of the claims 1-9, to be obtained by providing a fabric, knit, tricot or non-woven of fibres or yarns which are composed of at least two components with different melting points and subjecting 10 the cloth to a thermal treatment under pressure.

11. Cloth as claimed in any of the claims 1-9, to be obtained by calendering a fabric, knit or non-woven of fibres or yarns which are composed of at least two components with different melting points.

15 12. Cloth as claimed in any of the claims 1-11, wherein the fibres or yarns used are manufactured from polyester, polyamide, aromatic polyamide, polyethylene, polyacrylonitrile.

13. Method for manufacturing a cloth as claimed in 20 any of the claims 1-12, comprising of:

a) providing a fabric, knit, tricot or non-woven of fibres or yarns which are composed of at least two components with different melting points; and

b) subjecting the cloth to a thermal treatment under 25 pressure.

14. Method as claimed in claim 13, characterized in that subjecting of the cloth to a thermal treatment under pressure takes place by calendering.

15. Method as claimed in claim 14, characterized in 30 that the calendering takes place at a pressure of 10 to 60 tons, preferably 30 to 50 tons, and a temperature of 100 to 500°C, preferably 150 to 250°C, more preferably at about 180°C.

16. Method as claimed in claim 14, characterized in 35 that the cloth is manufactured from hybrid yarns of a low-melting (at about 170°C) polyester and a normally-melting (at about 254°C) polyester, and that the calendering takes place at a pressure of 30 to 50 tons and a temperature of about 180°C.

17. Sailcloth manufactured from cloth as claimed in any of the claims 1-12.
18. Conveyor belt or running belt manufactured from cloth as claimed in any of the claims 1-12.
- 5 19. Parachute material manufactured from cloth as claimed in any of the claims 1-12.
20. Material for ultra-light aircraft manufactured from cloth as claimed in any of the claims 1-12.
- 10 21. Filter for ultrafiltration or reverse osmosis manufactured from cloth as claimed in any of the claims 1-12.
- 15 22. Sun-protection product such as parasol, sun-blind, roller blind, Venetian blind, pleated curtain, manufactured from cloth as claimed in any of the claims 1-12.
23. Luggage article such as rucksack, suitcase, travel bag, ski bag, manufactured from cloth as claimed in any of the claims 1-12.
24. Clothing such as raincoats, windcheaters, sailing clothing, ski clothing, gloves, manufactured from cloth as claimed in any of the claims 1-12.
- 25 25. Airbag manufactured from cloth as claimed in any of the claims 1-12.
26. Tarpaulin manufactured from cloth as claimed in any of the claims 1-12.
27. Umbrella manufactured from cloth as claimed in any of the claims 1-12.
28. Shower curtain manufactured from cloth as claimed in any of the claims 1-12.
- 30 29. Use of a cloth as claimed in any of the claims 1-10 as sailcloth, as conveyor belts or running belts, as parachute material, in ultra-light aircraft such as hang-gliders, air balloons, filters for ultrafiltration or reverse osmosis, in sun-protection products such as
- 35 30. parasols, sunblinds, roller blinds, Venetian blinds, pleated curtains, in luggage articles such as rucksacks, suitcases, travel bags, ski bags, in clothing such as raincoats, windcheaters, sailing clothing, ski clothing, gloves, in airbags, tarpaulins, umbrellas, shower curtains etc.

Dec. 9. 2005 2:22PM

PCT/NL 9/0051 P. 18

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D03D15/00 D04B1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 D03D D04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 42 06 997 A (MILLIKEN EUROPE NV) 9 September 1993 see column 1, line 44 - column 2, line 13 ---	1-29
X	DE 40 09 611 A (STRAEHLE & HESS) 2 October 1991 see the whole document ---	1-9, 13-16, 25,29
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X,P	EP 0 768 406 A (HOECHST TREVIRAG GMBH & CO KG) 16 April 1997 see claim 1 ----	1

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the International search

1 April 1998

Date of mailing of the International search report

08/04/1998

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Information on patent family members

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PCT/NL 97/00681

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